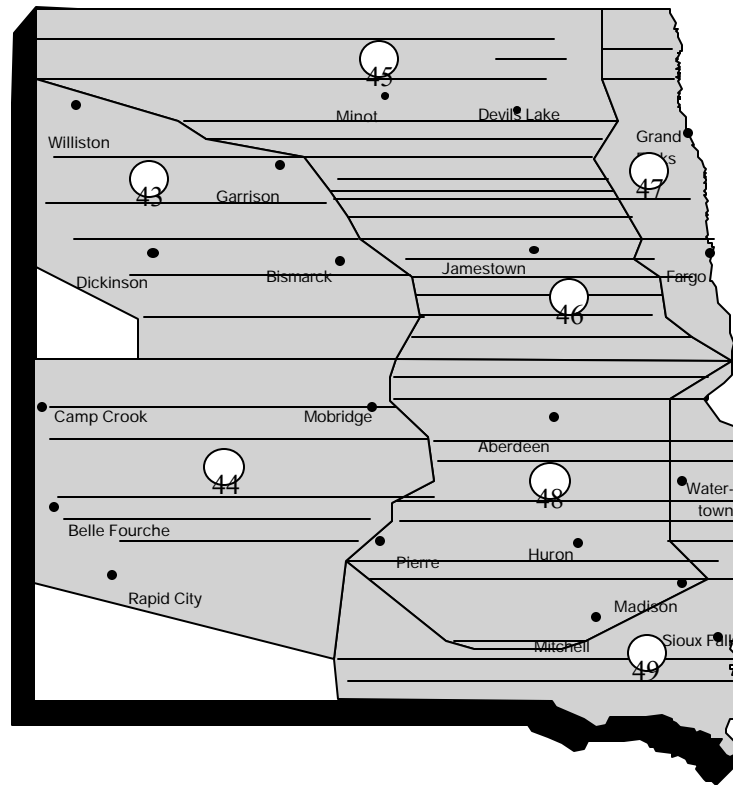


2006

**WATERFOWL BREEDING POPULATION SURVEY
FOR
SOUTH DAKOTA AND NORTH DAKOTA**



TITLE: Waterfowl Breeding Population and Habitat Survey for South and North Dakota

STRATA SURVEYED: 44, 48, 49 (South Dakota)
43, 45, 46, 47 (North Dakota)

DATES: 1 - 6 May 2006 (43 and 44)
6 - 25 May 2006 (45, 46, 47, 48, and 49)

DATA SUPPLIED BY: United States Fish and Wildlife Service
South Dakota Game, Fish, and Parks Department

Strata 45, 46, 47, 48, 49

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Strata 43 and 44

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ABSTRACT: The 2006 Waterfowl Breeding Ground and Habitat Survey for Eastern South and North Dakota was conducted 6 - 25 May using standard aerial coverage. Personnel changes in the eastern Dakotas occurred only in the ground crew. Wetland counts increased compared to 2005 in South Dakota (63%) but were similar to last year in North Dakota (7%). Compared to long-term averages, wetland indices were unchanged in both states (South Dakota 2%, North Dakota 10%). The majority of habitat conditions in the crew area were poor or fair. Limited supplies of good conditions were encountered in both states and one small area, considered excellent, was confined to extreme south eastern North Dakota and extreme north eastern South Dakota. The estimated waterfowl breeding population in South Dakota (2.144 million) was 35% above the 2005 index, -34% from the recent ten-year average, and similar to the long-term mean. In North Dakota, the waterfowl breeding population (3.931 million) was similar to last year, 25% below the ten-year average, and 33% above the long-term mean. The waterfowl production potential in the Dakotas in 2006 will be highly dependent on June weather patterns, but overall we expect production to be average or below average.

Selected information for 2006 is presented below:

South Dakota

| | 2006 Indices (thousands) | Percent Change From | | |
|------------------|---------------------------------|---------------------|----------------|----------------|
| | | 2005 | 1996-2005 mean | 1959-2005 mean |
| Mallard | 707.3 | 48% | -18% | 48% |
| Gadwall | 281.7 | NC | -42% | 20% |
| Blue-winged Teal | 710.5 | 38% | -42% | -14% |
| Northern Pintail | 124.7 | 73% | -30% | -41% |
| Redhead | 28.3 | 196% | -38% | -38% |
| Canvasback | 6.3 | 32% | NC | NC |
| Total Ducks | 2143.6 | 35% | -34% | NC |
| May Ponds | 531.5 | 63% | -21% | NC |

North Dakota

| | 2006 Indices | Percent Change From | | |
|------------------|--------------|---------------------|----------------|----------------|
| | (thousands) | 2005 | 1996-2005 mean | 1959-2005 mean |
| Mallard | 1247.5 | 16% | NC% | 98% |
| Gadwall | 496.1 | NC | -40% | 28% |
| Blue-winged Teal | 1082.2 | 14% | -34% | 22% |
| Northern Pintail | 215.8 | NC | -27% | -35% |
| Redhead | 114.3 | NC | -46% | -16% |
| Canvasback | 28.4 | NC | -33% | NC |
| Total Ducks | 3930.8 | NC | -25% | 33% |
| May Ponds | 811.5 | NC | -14% | NC |

METHODS: The procedures followed in conducting the survey are described in the Standard Operating Procedures for Aerial Breeding Ground and Habitat Surveys in North America, Section III, revised 1987. There were no changes in survey coverage and all transects were flown (Tables 3 and 6).

Personnel changes in 2006 occurred only in the ground crew. From the USFWS Region 6, Bart McDermott and Diana Whittington joined forces to assist leader Kammie Kruse with all ground operations. Mark Grovijahn, a Resource Biologist with South Dakota Game, Fish, and Parks Department, provided additional assistance conducting 2 air/ground segments. Air crew personnel were unchanged since 2004. Crewmembers participated in pre-survey training/review sessions relating to air and ground procedures.

Visibility Correction Factors (VCF's) in the crew area are calculated using observations collected from 17 air/ground comparison segments. Comparison segments in the survey unit are co-located with operational segments and all were completed. The VCF for wetlands, established by comparison of air and ground observations, was 1.08. Wetland counts and all other data are considered comparable to all years when VCF's were determined.

Aerial sampling was accomplished from a wheeled Cessna 185. The survey required about 67 hours of flight time including reconnaissance. Aerial crews continued to utilize on-board computers and the Hodges program to capture geo-referenced waterfowl and wetland observations. This year marked the first utilization in the crew area of the moving map portion of the data recording program. Surveying commenced 6 May in the eastern Dakotas and was completed on the 25th. Once the survey was initiated, 5 days were forfeited to adverse weather or duty time limitations. Information from Stratum 43 and 44 was collected 1 - 6 May by the Montana survey crew led by Flyway Biologist Ray Bentley. Our appreciation is extended to that crew for their efforts and contributions of data and habitat information from the Western Dakotas.

WEATHER AND HABITAT CONDITIONS: According to the U.S. Drought Monitor, South Dakota entered the fall of 2005 with the western half of the state being abnormally dry. October

and November temperatures were near normal. Significant rain events occurred in the eastern part of the state the last week in November when Huron received 4.69 inches of precipitation and various other locations in the eastern half of the state received amounts ranging from 2.5 - 3 inches. December brought in colder than normal temperatures. The below average temperatures didn't last and any frost seal that may have been present in wetland basins disappeared. By the end of the calendar year only the reporting stations of Aberdeen and Rapid City were below normal for precipitation and had received 95% and 88% of normal, respectively. Huron and Sioux Falls areas received over 5 inches above normal for the same period and ended the year 24% and 28% above normal precipitation. Most areas in South Dakota were within 5% of normal precipitation for the year. The new year brought slightly drier periods to the Aberdeen area, receiving only 3 inches of precipitation by the start of the survey, (85% of normal) and the Huron area received 2.69 inches (62% of normal). Temperatures remained near to slightly above normal until a warm stretch in April provided temperatures 8-10 degrees above normal. The warm April triggered and encouraged vegetation development and by the start of our survey, cool season grasses and tree leaves were well advanced (2 – 3 weeks ahead of "normal"). As a result of a huge low-pressure system parked over the Great Lakes region, temperatures were 2 to 5 degrees below normal in South Dakota during the first half of May. Generally, only minor amounts of precipitation were received during this period but because of the cool temperatures, wetland conditions were somewhat stable. Summer like temperatures presided for the remainder of May and with the common prairie winds, wetland levels continued to lower.

The north eastern corner of the South Dakota crew area (particularly the northern end of the Prairie Coteau) had the most "winter" of any area of the state and precipitation in the form of rain continued into the spring. Habitat conditions in this region are mostly good with a small sliver of excellent conditions in the extreme north eastern portion. The east central and south eastern third, and to some extent, the remainder of the southern quarter of the South Dakota crew area had less winter snow but received fair to good spring rains. As a result, waterfowl breeding habitat in most of the eastern 2/3's of the South Dakota Crew area improved since last year and is now considered fair to good. Generally, the western third of South Dakota, east of the Missouri River resembles the poor conditions of last year. In areas considered poor, no temporary or seasonal water exists. Numerous semi-permanent wetlands are now dry and those that have water are highly receded. Permanent wetlands and dugouts were typically in various stages of recession. In fair areas, no temporary water and only the occasional seasonal wetlands occurred. Most semi-permanent and permanent basins contained water and were somewhat receded. In the good areas, temporary water was scarce but pockets of seasonal water were encountered. The more persistent basins, including dugouts, were nearly full in most cases. The small area of excellent in the north east corner of the state brought back memories of the 1990's with water everywhere.

Nesting cover was variable. In the eastern uplands, warm April temperatures encouraged early stands of nesting cover. Moving westward onto the drift plain, the overall drier conditions permitted agricultural interests to plow close to or through many dry basins. Generally, upland nesting cover was adequate in the east with supplies diminishing to the west. The same pattern occurred for wetland emergent vegetation where supplies diminished as one moved from east to west and wetlands became more degraded.

SOUTH DAKOTA: (St. 44: 1 - 4 May, St. 48, 49: 6 -12 May)

Stratum 44 – Wetland counts in west river South Dakota increased 79% since last year. The 2006 index was slightly above the ten-year average (13%) and 27% above the long-term average. Habitat along the eastern edge of the stratum was considered poor by the Montana crew. The majority of the remainder of the stratum was classed fair with a small area of good in the west central and north west regions.

Stratum 48 – Slight improvements in general habitat conditions occurred in Stratum 48 compared to 2005. Although much of central (fair) and western (poor) portions of the drift prairie remain depressed, winter and spring precipitation provided some improvement to habitat in the south central (fair) and eastern (good) portions. The 2006 wetland index was 56% above the 2005 figure, but fell short of the ten-year (-41%) and long-term (-18%) averages.

Stratum 49 –In Stratum 49, the wetland index increased 54% since last year. The wetland count in 2006 was 13% below the ten-year mean and similar to the long-term average. Habitat conditions improved modestly since last year in all areas except the south western border region.

North Dakota entered into the fall with many areas 25% above normal for rainfall. September and October brought minor precipitation to the state, although Jamestown received 3 inches and a rogue blizzard in early October in central regions suggested that a “real” winter was in store. Albeit, temperatures for the September/October period averaged above normal (4-5 degrees). November was a warm dry month, with above average temperatures and below normal precipitation. December started with a cold snap that had temperatures 10 to 15 degrees below normal but was back up to 20 degrees above normal by the end of the month. Bismarck and Fargo areas were the only areas to receive above average precipitation for the month. Williston and portions of the North West were the only areas not receiving normal precipitation for 2005. 2006 began like 2005 ended, warm and dry. A cold front lowered temperatures during the second week but these conditions were short lived. The remainder of January and February was as much as 17 degrees above normal. This warm period did not bring rain and no area in North Dakota received 1 inch of precipitation through February. Overall, the most persistent winter conditions and the most consistent precipitation was received in the northern tier of counties from the Turtle Mountains east to the Minnesota border and south, basically encompassing stratum 47. March weather offered little improvement as temperatures continued above normal and precipitation was minimal. April saw normal to slightly above average temperatures and little rain. One major system delivered heavy amounts of rain (over 2 inches) to western portions of North Dakota. Other areas in the state received less than 1 inch. At survey start the poorest habitat conditions were generally around Bismarck and essentially all portions of the coteau slope, west of the Missouri Coteau. Also considered poor was an area in the central portion of stratum 45. Most of the remainder of the drift prairie was considered (marginally) fair. Good conditions were observed along the northern tier of counties from the Turtle Mountains eastward and in a relatively small zone running north east and south east from Devils Lake. Another area of good to excellent conditions occurred in the extreme south eastern portion of North Dakota and was a northern extension of conditions in South Dakota.

As in South Dakota, warm April temperatures in North Dakota encouraged earlier than normal vegetation development. Nesting cover was generally considered at least adequate in areas considered fair or better. Wetland conditions in the four habitat categories were similar to those described in South Dakota.

NORTH DAKOTA (St. 43: 4 - 6 May, St. 45, 46, 47: 13 - 25 May)

Stratum 43 – Water counts in Stratum 43 were 32% below 2005 levels but similar to both the ten-year (-10%) and long-term (7%) averages. General habitat conditions in the stratum were fair overall with the exception of the eastern fringe, which was poor.

Stratum 45 – The wetland index was unchanged in Stratum 45 since last year (10%). The 2006 index was 16% below the ten-year average and similar to the long-term mean (5%). We considered habitat conditions relatively good in the northern tier of counties from about the Turtle Mountains east to the stratum 47 border. From here, a narrow swath of good habitat carried south west to Devils Lake and then south east for about 40 miles. The remaining 80% of the stratum was considered fair to poor.

Stratum 46 – Stratum 46 posted a 29% increase in water since last year. Although 19% below the ten-year average, the 2006 wetland index was 14% above the long-term figure. The moisture gradient in stratum 46 followed this year's "typical" pattern of wetter in the east and drier in the west. A small area of excellent to good conditions presided in the extreme south eastern portion of the stratum but generally, the western 2/3 of the stratum was classed as fair or poor.

Stratum 47 – Wetland conditions in Stratum 47 in 2006 increased 71% since last year. The 2006 index was above the ten-year (26%) and long-term (80%) averages, as well. The southern 1/3 of the stratum was an extension of the good/excellent portion from South Dakota. The balance of stratum 47 was considered fair due more to lack of quality nesting cover rather than water conditions in the remaining intact basins.

BREEDING POPULATION ESTIMATES: The 2006 total breeding waterfowl estimate for South Dakota is 2.144 million birds. The estimate increased 35% since 2005, was 34% lower than the ten-year average and unchanged from the long-term average (Table 1).

Dabbling ducks exhibited a trend nearly identical to total ducks where the 2006 index was 34% above last year, 34% below the ten-year average and unchanged compared to the long-term mean. Three species of dabbling ducks were below long-term averages (Blue-winged teal -14%, Northern Shoveler -27%, and Northern Pintail -41%) while the remainder of the dabbling group was similar to or above the long-term comparison.

The total estimate for diving ducks in 2006 increased 69% since last year and was primarily a result of the Ruddy Duck index. All diving duck estimates were at or below their respective long-term averages except Ruddy Ducks (26%).

The 2006 breeding population estimate for American coot increased 86% since last year but

remained well below the ten-year (-77%) and long-term (-68%) averages. The Canada goose estimate increased slightly compared to last year (12%), was similar to the ten-year average (6%), but remained well above the long term mean (234%).

In North Dakota, the 2006 total breeding population estimate is 3.931 million birds. The 2006 estimate was similar to the 2005 level (7%), 25% below the ten-year average, but remained above (33%) the long-term mean (Table 4).

As in South Dakota, the dabbling duck group heavily influenced the trend of total ducks and provided similar changes. Dabbling duck estimates for North Dakota in 2006 were 7%, -24%, and 35% compared to last year, the ten-year, and long-term time comparisons. Breeding presence varied by species compared to last year but all dabblers except pintails (-35%) were significantly above long-term averages.

North Dakota diving duck totals were unchanged (6%) since 2005. Only redhead (-16%) and ring-necked ducks (-31%, small sample) fell short of their long-term averages.

American coots rebounded 23% since last year but remained well below the ten-year (-85%) and long-term (-73%) averages. Canada goose estimates were similar to or above all three time comparisons (-3%, 70%, and 544%).

CONCLUSIONS: As a result of the mild spring, plant phenology was 2 – 3 weeks more advanced than in 2005. The vegetation development caused some initial concern relating to bird detection and visibility correction factors. With the recessionary stages of most wetlands, the birds were quite visible and our concerns were quickly alleviated. Visibility correction factors, derived from air/ground comparison segments, were of reasonable values. Drake to pair ratios also indicated breeding activities further advanced than last year but during the survey no anomalies, in terms of flocked or grouped birds, were noted. We believe our survey timing was later than last year, but acceptable.

Wetland counts in North Dakota were unchanged since 2005 and near the long-term average. In South Dakota, the wetland index increased 63% compared to last year but was unchanged compared to the long-term average. Generally, nesting cover in the region was adequate. But, because remaining permanent and semi-permanent wetlands were in recessionary stages and temporary and seasonal water was absent from most of the landscape, we considered overall habitat conditions below average. By mid-June, weather patterns (warmer and drier than normal) had not been conducive to habitat maintenance, much less improvements. Of near future concern are the large number of CRP contracts which will expire in 2007 and the intense interest in the production of bio-fuels and the potential conversion of many acres to corn and soy beans.

Waterfowl breeding populations generally showed greater increases since last year in South Dakota compared to those in North Dakota. This general trend corresponds with this years wetland counts in the two states. Compared to long-term averages, breeding waterfowl in North Dakota are generally at higher levels and nearly all above long-term averages. In South Dakota, long-term comparisons are more variable and more values are below long-term figures.

Considering average May wetland counts in both states and deteriorating conditions in June, an average breeding population in South Dakota but an above average BPOP in North Dakota, we expect waterfowl production in 2006 will be below average in South Dakota and about average in North Dakota.

John W. Solberg and Mike Rich
June 2006

Table 1. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean (from 1959) for South Dakota.

| | Stratum (2006) | | | | | | | % Change From | | |
|-----------------------|----------------|--------|-------|------------|------------|--------------|----------------|---------------|--------------|----------------|
| Species/Ponds | 44 | 48 | 49 | 2006 Total | 2005 Total | 10-Year Mean | Long-Term Mean | 2005 | 10-Year Mean | Long-Term Mean |
| Ducks | | | | | | | | | | |
| Dabblers | | | | | | | | | | |
| Mallard | 172.0 | 352.7 | 182.6 | 707.3 | 478.5 | 865.5 | 478.7 | 47.80% | -18.3% | 47.7% |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -- | -- | -100.0% |
| Gadwall | 56.1 | 175.1 | 50.5 | 281.7 | 282.3 | 485.7 | 234.5 | -0.20% | -42.0% | 20.1% |
| Am. wigeon | 29.8 | 10.1 | 9.0 | 48.8 | 31.4 | 48.1 | 38.8 | 55.40% | 1.5% | 25.9% |
| Am. green-winged teal | 9.4 | 20.8 | 0.0 | 30.1 | 49.4 | 45.8 | 30.0 | -39.00% | -34.2% | 0.4% |
| Blue-winged teal | 99.1 | 360.4 | 251.0 | 710.5 | 514.2 | 1218.9 | 829.9 | 38.20% | -41.7% | -14.4% |
| N. shoveler | 29.6 | 84.0 | 22.9 | 136.5 | 99.7 | 250.5 | 186.3 | 36.90% | -45.5% | -26.7% |
| N. pintail | 43.8 | 66.2 | 14.7 | 124.7 | 72.2 | 179.4 | 210.4 | 72.70% | -30.5% | -40.7% |
| Subtotal | 439.6 | 1069.3 | 530.7 | 2039.6 | 1527.7 | 3093.8 | 2008.6 | 33.50% | -34.1% | 1.5% |
| Divers | | | | | | | | | | |
| Redhead | 0.0 | 25.6 | 2.7 | 28.3 | 9.6 | 45.6 | 46.1 | 196.50% | -37.9% | -38.5% |
| Canvasback | 0.0 | 3.9 | 2.3 | 6.3 | 4.7 | 6.1 | 6.3 | 32.30% | 2.9% | -0.6% |
| Scaups | 1.9 | 14.5 | 8.0 | 24.3 | 30.3 | 56.5 | 43.2 | -19.70% | -57.0% | -43.8% |
| Ring-necked duck | 2.6 | 0.9 | 1.4 | 5.0 | 6.1 | 12.4 | 8.2 | -18.50% | -59.9% | -39.6% |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | -- | -100.0% | -100.0% |
| Bufflehead | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 1.2 | 1.5 | -100.00% | -100.0% | -100.0% |
| Ruddy Duck | 3.3 | 34.2 | 1.8 | 39.3 | 9.5 | 38.0 | 31.3 | 313.40% | 3.3% | 25.5% |
| Subtotal | 7.8 | 79.1 | 16.2 | 103.1 | 61.2 | 159.9 | 136.9 | 68.60% | -35.5% | -24.7% |
| Miscellaneous | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -- | -- | -- |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -- | -- | -- |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -- | -- | -100.0% |
| Mergansers | 0.5 | 0.3 | 0.0 | 0.9 | 0.0 | 2.6 | 1.5 | -- | -65.9% | -43.6% |
| Subtotal | 0.5 | 0.3 | 0.0 | 0.9 | 0.0 | 2.6 | 1.6 | -- | -65.9% | -44.8% |
| Total Ducks | 448.0 | 1148.7 | 546.9 | 2143.6 | 1588.9 | 3256.2 | 2147.1 | 34.90% | -34.2% | -0.2% |
| Canada Goose | 22.4 | 77.3 | 21.2 | 121.0 | 108.2 | 114.3 | 36.3 | 11.80% | 5.9% | 233.5% |
| Am. coot | 1.8 | 19.2 | 39.6 | 60.5 | 32.6 | 262.8 | 191.0 | 86.00% | -77.0% | -68.3% |
| Ponds | 187.9 | 201.2 | 142.5 | 531.5 | 326.5 | 671.6 | 523.6 | 62.80% | -20.9% | 1.5% |

Table 2. Long-term trend in adjusted May pond estimates (thousands) by stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean (from 1974) for South Dakota. Estimates prior to 1974 were not adjusted for visibility bias.

| Year | Stratum (2006) | | | Total |
|---------------------|----------------|--------|--------|--------|
| | 44 | 48 | 49 | |
| 1961 | 33.1 | 48.1 | 34.2 | 115.4 |
| 1962 | 69.5 | 152.3 | 95.7 | 317.4 |
| 1963 | 80.2 | 142.2 | 106.9 | 329.3 |
| 1964 | 62.0 | 79.3 | 56.8 | 198.0 |
| 1965 | 84.5 | 100.3 | 53.0 | 237.8 |
| 1966 | 94.5 | 143.6 | 79.7 | 317.8 |
| 1967 | 90.2 | 132.4 | 66.5 | 289.0 |
| 1968 | 71.8 | 146.0 | 61.1 | 278.9 |
| 1969 | 156.5 | 263.5 | 111.6 | 531.6 |
| 1970 | 161.3 | 183.3 | 58.9 | 403.4 |
| 1971 | 146.4 | 132.7 | 85.4 | 364.4 |
| 1972 | 205.5 | 263.8 | 108.1 | 577.4 |
| 1973 | 153.4 | 126.1 | 82.4 | 362.0 |
| 1974 | 68.0 | 186.0 | 125.4 | 379.4 |
| 1975 | 151.0 | 236.4 | 108.3 | 495.7 |
| 1976 | 92.9 | 121.8 | 93.1 | 307.8 |
| 1977 | 84.7 | 114.5 | 73.0 | 272.3 |
| 1978 | 212.3 | 307.4 | 131.5 | 651.2 |
| 1979 | 82.0 | 214.6 | 148.6 | 445.3 |
| 1980 | 66.8 | 108.4 | 88.3 | 263.5 |
| 1981 | 64.3 | 58.8 | 40.0 | 163.0 |
| 1982 | 148.1 | 176.7 | 73.7 | 398.4 |
| 1983 | 104.3 | 189.4 | 142.6 | 436.4 |
| 1984 | 142.8 | 262.4 | 189.4 | 594.6 |
| 1985 | 116.7 | 183.8 | 124.4 | 425.0 |
| 1986 | 216.7 | 260.5 | 132.2 | 609.4 |
| 1987 | 194.9 | 216.4 | 105.9 | 517.3 |
| 1988 | 92.5 | 99.9 | 114.4 | 306.8 |
| 1989 | 195.4 | 222.0 | 86.7 | 504.1 |
| 1990 | 124.0 | 79.4 | 56.7 | 260.0 |
| 1991 | 106.5 | 113.1 | 69.5 | 289.1 |
| 1992 | 107.5 | 96.8 | 61.6 | 265.8 |
| 1993 | 141.1 | 334.7 | 225.0 | 700.7 |
| 1994 | 281.1 | 356.5 | 180.9 | 818.4 |
| 1995 | 279.4 | 458.2 | 195.9 | 933.4 |
| 1996 | 324.4 | 418.2 | 172.2 | 914.8 |
| 1997 | 278.8 | 478.8 | 167.5 | 925.1 |
| 1998 | 195.3 | 337.8 | 162.0 | 695.1 |
| 1999 | 157.4 | 618.1 | 249.4 | 1025.0 |
| 2000 | 161.3 | 324.7 | 141.6 | 627.6 |
| 2001 | 105.3 | 562.9 | 320.9 | 989.1 |
| 2002 | 85.9 | 204.1 | 143.8 | 433.9 |
| 2003 | 111.9 | 240.7 | 121.4 | 473.9 |
| 2004 | 140.8 | 100.1 | 64.3 | 305.2 |
| 2005 | 105.2 | 129.0 | 92.4 | 326.5 |
| 2006 | 187.9 | 201.2 | 142.5 | 531.5 |
| 10-year Mean | 166.6 | 341.4 | 163.5 | 671.6 |
| Long-term Mean | 148.1 | 244.1 | 131.3 | 523.6 |
| Percent Change: | | | | |
| From 2005 | 78.6% | 56.0% | 54.2% | 62.8% |
| From 10-year Mean | 12.7% | -41.1% | -12.9% | -20.9% |
| From Long-term Mean | 26.8% | -17.6% | 8.5% | 1.5% |

Table 3. Survey design for South Dakota, May 2006.

| | Stratum | | | |
|-------------------------------|----------|----------|----------|--------|
| | 44 | 48 | 49 | Total |
| <hr/> | | | | |
| <u>Survey design</u> | | | | |
| Square miles in stratum | 27,299 | 24,587 | 15,830 | 67,716 |
| Square miles in sample | 216 | 315 | 171 | 702 |
| Linear miles in sample | 864 | 1,260 | 684 | 2,808 |
| Number of transects in sample | 5 | 9 | 11 | 25 |
| Number of segments in sample | 48 | 70 | 38 | 156 |
| Expansion factor | 126.3842 | 78.05396 | 92.57309 | --- |
| | | | | |
| <u>Current year coverage</u> | | | | |
| Square miles in sample | 216 | 315 | 171 | 702 |
| Linear miles in sample | 864 | 1,260 | 684 | 2,808 |
| Number of transects in sample | 5 | 9 | 11 | 25 |
| Number of segments in sample | 48 | 70 | 38 | 156 |
| Expansion factor | 126.3842 | 78.05396 | 92.57309 | --- |
| <hr/> | | | | |

Appendix 1. Long –term trend in adjusted waterfowl breeding population estimates (thousands) in South Dakota.

| Species/Ponds | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|
| Ducks | | | | | | | | | | |
| Dabblers | | | | | | | | | | |
| Mallard | 108.2 | 176.6 | 212.1 | 367.3 | 535.8 | 261.1 | 314.5 | 216.3 | 248.2 | 450.7 |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 0.0 | 9.9 | 18.9 | 73.9 | 164.0 | 53.6 | 115.4 | 112.9 | 75.1 | 197.8 |
| Am. wigeon | 7.1 | 9.6 | 6.1 | 8.1 | 3.1 | 4.4 | 0.0 | 9.6 | 29.7 | 22.6 |
| Am. green-winged teal | 0.0 | 0.0 | 2.7 | 10.0 | 2.7 | 0.0 | 0.0 | 7.7 | 9.6 | 23.5 |
| Blue-winged teal | 413.1 | 524.5 | 673.8 | 602.5 | 1201.5 | 686.3 | 703.6 | 623.9 | 313.7 | 466.1 |
| N. shoveler | 38.4 | 156.3 | 96.4 | 335.5 | 225.4 | 95.7 | 90.2 | 108.3 | 82.2 | 150.6 |
| N. pintail | 25.5 | 305.7 | 175.4 | 557.8 | 221.6 | 108.8 | 128.9 | 228.9 | 186.6 | 129.1 |
| Subtotal | 592.3 | 1182.5 | 1185.3 | 1955.1 | 2354.1 | 1209.9 | 1352.6 | 1307.7 | 945.1 | 1440.2 |
| Divers | | | | | | | | | | |
| Redhead | 0.0 | 30.1 | 14.3 | 56.4 | 50.5 | 50.4 | 56.4 | 56.7 | 20.1 | 33.4 |
| Canvasback | 2.8 | 1.4 | 2.8 | 2.2 | 2.6 | 5.0 | 2.0 | 6.1 | 3.5 | 2.6 |
| Scaups | 13.6 | 18.3 | 8.1 | 32.9 | 11.0 | 1.4 | 29.2 | 29.7 | 11.2 | 22.3 |
| Ring-necked duck | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.0 | 0.0 | 1.4 | 1.1 | 0.0 |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bufflehead | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.4 | 0.9 | 0.0 |
| Ruddy Duck | 0.0 | 10.7 | 3.6 | 11.8 | 5.6 | 1.4 | 1.9 | 5.6 | 0.0 | 8.9 |
| Subtotal | 16.4 | 60.5 | 28.8 | 103.4 | 70.7 | 58.1 | 89.5 | 100.0 | 36.8 | 67.2 |
| Miscellaneous | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 |
| Subtotal | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 |
| Total Ducks | 608.7 | 1243.0 | 1214.2 | 2058.5 | 2424.9 | 1268.1 | 1442.0 | 1409.0 | 982.0 | 1507.4 |
| Canada Goose | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.3 | 0.9 | 0.0 |
| Am. coot | 31.1 | 40.4 | 29.3 | 61.0 | 21.0 | 53.4 | 19.3 | 33.8 | 28.0 | 75.7 |
| Ponds | | | | | | | | | | |
| Species/Ponds | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
| Ducks | | | | | | | | | | |
| Dabblers | | | | | | | | | | |
| Mallard | 443.3 | 415.2 | 392.0 | 493.0 | 432.6 | 276.5 | 354.3 | 256.2 | 186.8 | 537.3 |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 243.8 | 214.5 | 162.2 | 192.1 | 149.9 | 85.5 | 126.4 | 44.6 | 31.4 | 233.6 |
| Am. wigeon | 30.7 | 21.4 | 19.0 | 99.1 | 43.7 | 16.3 | 42.7 | 56.6 | 29.2 | 92.7 |
| Am. green-winged teal | 29.0 | 115.1 | 25.4 | 42.6 | 29.6 | 19.1 | 37.4 | 31.1 | 9.8 | 38.5 |
| Blue-winged teal | 742.2 | 706.8 | 654.3 | 1209.0 | 777.1 | 348.8 | 437.2 | 351.7 | 318.9 | 1287.3 |
| N. shoveler | 195.7 | 260.3 | 103.2 | 330.9 | 110.6 | 51.1 | 92.9 | 56.5 | 58.6 | 419.1 |
| N. pintail | 396.6 | 333.3 | 247.8 | 395.4 | 275.1 | 99.1 | 218.2 | 111.7 | 130.8 | 678.4 |
| Subtotal | 2081.2 | 2066.8 | 1603.9 | 2762.1 | 1818.6 | 896.5 | 1309.0 | 908.4 | 765.5 | 3287.0 |
| Divers | | | | | | | | | | |
| Redhead | 87.8 | 53.6 | 60.7 | 48.6 | 34.6 | 20.2 | 27.3 | 4.1 | 10.8 | 144.4 |
| Canvasback | 17.9 | 6.1 | 2.8 | 14.2 | 13.1 | 6.4 | 5.6 | 3.1 | 3.0 | 12.3 |
| Scaups | 12.1 | 74.4 | 7.3 | 41.1 | 19.2 | 13.0 | 12.7 | 45.3 | 16.4 | 73.7 |
| Ring-necked duck | 0.0 | 1.1 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.4 | 1.4 |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.0 |
| Bufflehead | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.5 |
| Ruddy Duck | 7.0 | 39.3 | 27.7 | 30.1 | 18.6 | 23.2 | 209.7 | 6.2 | 5.8 | 28.7 |
| Subtotal | 124.8 | 174.5 | 99.0 | 136.6 | 85.5 | 63.2 | 255.4 | 59.0 | 36.4 | 261.9 |
| Miscellaneous | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Subtotal | 0.0 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Ducks | 2206.0 | 2241.2 | 1702.9 | 2898.7 | 1904.9 | 959.7 | 1564.4 | 967.4 | 801.9 | 3548.9 |
| Canada Goose | 8.2 | 0.9 | 2.1 | 3.4 | 6.4 | 3.7 | 1.9 | 3.0 | 1.8 | 7.2 |
| Am. coot | 91.1 | 91.8 | 35.0 | 110.9 | 126.1 | 27.8 | 75.7 | 66.6 | 91.4 | 232.5 |
| Ponds | | | | | | 379.4 | 495.7 | 307.8 | 272.3 | 651.2 |

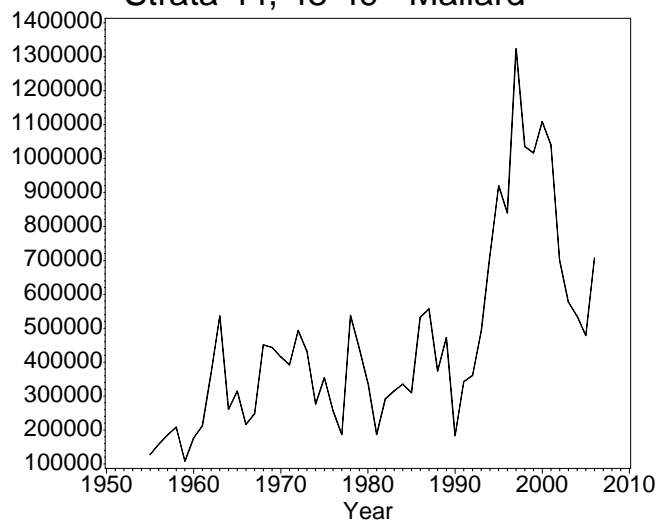
Appendix 1 (continued). Long –term trend in adjusted waterfowl breeding population estimates (thousands) in South Dakota.

| Species/Ponds | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Ducks | | | | | | | | | | |
| Dabblers | | | | | | | | | | |
| Mallard | 441.7 | 338.9 | 186.8 | 291.7 | 314.9 | 334.9 | 310.1 | 532.0 | 556.8 | 374.1 |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 136.7 | 69.8 | 113.6 | 189.1 | 219.0 | 263.7 | 145.5 | 254.3 | 205.7 | 222.5 |
| Am. wigeon | 33.6 | 41.5 | 60.0 | 40.7 | 73.8 | 87.0 | 45.2 | 39.7 | 45.6 | 48.8 |
| Am. green-winged teal | 19.3 | 70.2 | 21.1 | 34.9 | 36.6 | 22.0 | 31.6 | 52.1 | 23.4 | 25.5 |
| Blue-winged teal | 906.0 | 483.3 | 254.1 | 519.9 | 801.8 | 938.8 | 604.5 | 1433.5 | 777.1 | 617.1 |
| N. shoveler | 341.8 | 59.3 | 66.7 | 152.4 | 200.0 | 236.9 | 113.2 | 379.8 | 226.9 | 84.4 |
| N. pintail | 280.0 | 119.7 | 53.0 | 204.2 | 223.8 | 263.5 | 165.3 | 389.5 | 212.8 | 118.4 |
| Subtotal | 2159.0 | 1182.6 | 755.3 | 1432.9 | 1869.9 | 2146.9 | 1415.3 | 3080.8 | 2048.2 | 1490.9 |
| Divers | | | | | | | | | | |
| Redhead | 50.9 | 28.2 | 22.0 | 45.2 | 82.9 | 111.9 | 35.9 | 64.2 | 34.1 | 19.3 |
| Canvasback | 5.6 | 8.0 | 5.9 | 2.2 | 2.3 | 15.8 | 4.6 | 11.5 | 5.7 | 7.6 |
| Scaups | 36.7 | 5.4 | 19.1 | 43.7 | 54.3 | 58.6 | 30.6 | 104.7 | 35.4 | 63.2 |
| Ring-necked duck | 0.6 | 1.2 | 2.8 | 7.1 | 59.0 | 17.3 | 1.4 | 18.3 | 14.4 | 5.7 |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 1.2 | 2.4 | 0.8 | 0.8 | 0.8 | 0.0 | 0.0 |
| Bufflehead | 1.5 | 1.1 | 0.9 | 3.1 | 6.1 | 2.8 | 0.0 | 4.8 | 0.0 | 2.9 |
| Ruddy Duck | 16.0 | 21.6 | 67.0 | 84.4 | 88.9 | 48.7 | 23.1 | 69.4 | 28.5 | 3.2 |
| Subtotal | 111.3 | 65.5 | 117.8 | 187.0 | 295.9 | 255.8 | 96.5 | 273.6 | 118.1 | 101.8 |
| Miscellaneous | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 2.5 | 0.8 | 0.0 | 7.0 | 5.7 | 6.1 | 0.0 | 0.0 | 0.0 | 2.1 |
| Subtotal | 2.5 | 0.8 | 0.0 | 7.0 | 5.7 | 6.1 | 0.0 | 0.0 | 0.0 | 2.1 |
| Total Ducks | 2272.9 | 1248.9 | 873.1 | 1626.9 | 2171.4 | 2408.9 | 1511.8 | 3354.5 | 2166.3 | 1594.7 |
| Canada Goose | 4.8 | 3.4 | 9.8 | 23.9 | 13.0 | 19.0 | 15.2 | 12.5 | 17.6 | 57.2 |
| Am. coot | 356.1 | 77.1 | 176.8 | 202.7 | 263.5 | 603.7 | 196.5 | 487.5 | 427.3 | 436.4 |
| Ponds | 445.3 | 263.5 | 163.0 | 398.4 | 436.4 | 594.6 | 425.0 | 609.4 | 517.3 | 306.8 |
| Species/Ponds | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
| Ducks | | | | | | | | | | |
| Dabblers | | | | | | | | | | |
| Mallard | 472.0 | 183.5 | 342.6 | 360.6 | 491.5 | 715.9 | 919.7 | 839.8 | 1323.2 | 1035.6 |
| Am. black duck | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 177.7 | 125.7 | 282.9 | 281.5 | 246.6 | 383.0 | 541.5 | 451.8 | 819.5 | 624.2 |
| Am. wigeon | 21.6 | 27.4 | 44.4 | 32.9 | 17.3 | 83.6 | 46.8 | 47.6 | 71.3 | 74.6 |
| Am. green-winged teal | 24.4 | 8.5 | 17.0 | 12.6 | 6.6 | 55.2 | 58.4 | 63.0 | 69.4 | 34.3 |
| Blue-winged teal | 860.2 | 346.3 | 1075.4 | 626.4 | 679.9 | 1383.6 | 1468.4 | 1390.9 | 1535.0 | 1573.4 |
| N. shoveler | 185.4 | 79.2 | 117.2 | 102.0 | 213.4 | 283.5 | 350.0 | 287.6 | 414.3 | 230.3 |
| N. pintail | 148.3 | 63.4 | 69.8 | 65.7 | 166.7 | 230.1 | 364.2 | 187.3 | 349.9 | 205.4 |
| Subtotal | 1889.5 | 834.3 | 1949.3 | 1481.8 | 1821.9 | 3134.8 | 3749.0 | 3268.0 | 4582.7 | 3777.8 |
| Divers | | | | | | | | | | |
| Redhead | 55.1 | 16.7 | 11.7 | 41.0 | 62.4 | 98.2 | 68.4 | 54.3 | 55.6 | 78.9 |
| Canvasback | 5.3 | 8.1 | 5.3 | 1.4 | 8.0 | 14.6 | 7.6 | 9.1 | 9.2 | 4.5 |
| Scaups | 80.4 | 43.5 | 66.8 | 47.9 | 7.3 | 155.2 | 120.9 | 94.6 | 75.6 | 87.4 |
| Ring-necked duck | 17.7 | 17.6 | 5.5 | 27.6 | 5.8 | 11.1 | 41.6 | 17.4 | 19.1 | 8.4 |
| Goldeneyes | 0.0 | 0.0 | 3.6 | 0.0 | 0.0 | 0.8 | 0.8 | 0.9 | 0.0 | 0.0 |
| Bufflehead | 5.0 | 0.5 | 1.2 | 7.5 | 0.0 | 12.0 | 5.9 | 1.2 | 1.3 | 0.6 |
| Ruddy Duck | 44.0 | 34.1 | 10.2 | 3.9 | 21.5 | 36.7 | 43.2 | 14.7 | 18.7 | 24.9 |
| Subtotal | 207.6 | 120.5 | 104.2 | 129.3 | 105.0 | 328.7 | 288.4 | 192.1 | 179.5 | 204.8 |
| Miscellaneous | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 1.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 3.5 | 2.4 | 4.0 | 0.0 | 2.1 | 3.7 | 4.9 | 0.5 | 7.7 | 2.5 |
| Subtotal | 3.5 | 2.4 | 4.0 | 1.6 | 2.1 | 3.7 | 4.9 | 0.5 | 7.7 | 2.5 |
| Total Ducks | 2100.5 | 957.3 | 2057.5 | 1612.7 | 1929.1 | 3467.2 | 4042.3 | 3460.6 | 4769.9 | 3985.1 |
| Canada Goose | 65.4 | 46.2 | 44.2 | 48.6 | 37.7 | 46.5 | 55.9 | 73.5 | 86.8 | 99.8 |
| Am. coot | 284.7 | 191.5 | 77.4 | 132.8 | 167.2 | 311.0 | 616.9 | 409.9 | 525.7 | 469.0 |
| Ponds | 504.1 | 260.0 | 289.1 | 265.8 | 700.7 | 818.4 | 933.4 | 914.8 | 925.1 | 695.1 |

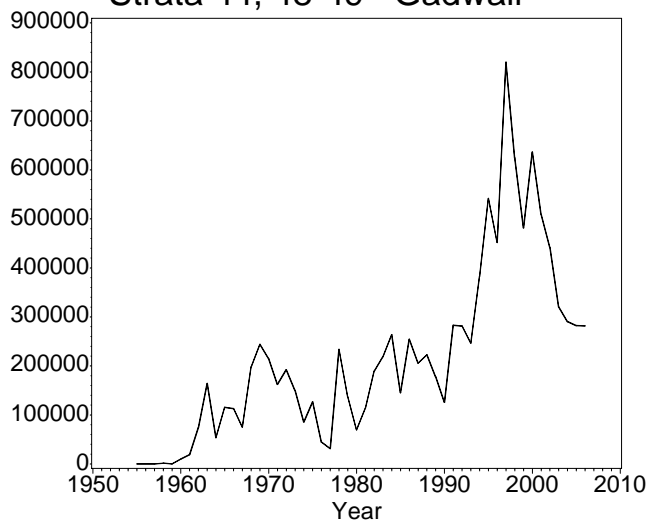
Appendix 1 (continued). Long –term trend in adjusted waterfowl breeding population estimates (thousands) in South Dakota.

| Species/Ponds | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Ducks | | | | | | | | |
| Dabblers | | | | | | | | |
| Mallard | 1016.4 | 1108.4 | 1040.5 | 699.3 | 577.5 | 535.7 | 478.5 | 707.3 |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 481.6 | 636.2 | 508.9 | 441.6 | 320.2 | 290.4 | 282.3 | 281.7 |
| Am. wigeon | 49.1 | 69.9 | 53.5 | 33.0 | 27.0 | 23.1 | 31.4 | 48.8 |
| Am. green-winged teal | 39.1 | 51.6 | 69.8 | 28.2 | 26.4 | 26.7 | 49.4 | 30.1 |
| Blue-winged teal | 1516.6 | 1576.9 | 1608.7 | 1043.1 | 859.9 | 570.4 | 514.2 | 710.5 |
| N. shoveler | 364.3 | 226.8 | 461.9 | 188.3 | 131.2 | 100.9 | 99.7 | 136.5 |
| N. pintail | 201.9 | 200.5 | 385.4 | 88.1 | 39.0 | 63.8 | 72.2 | 124.7 |
| Subtotal | 3669.0 | 3870.3 | 4128.7 | 2521.6 | 1981.3 | 1610.9 | 1527.7 | 2039.6 |
| Divers | | | | | | | | |
| Redhead | 56.0 | 33.0 | 51.0 | 75.6 | 28.5 | 13.7 | 9.6 | 28.3 |
| Canvasback | 2.9 | 6.7 | 5.1 | 7.8 | 3.1 | 7.8 | 4.7 | 6.3 |
| Scaups | 40.3 | 59.1 | 44.5 | 66.6 | 37.0 | 30.0 | 30.3 | 24.3 |
| Ring-necked duck | 25.7 | 10.8 | 8.7 | 13.3 | 8.9 | 5.0 | 6.1 | 5.0 |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bufflehead | 2.3 | 0.4 | 0.6 | 1.9 | 1.6 | 1.0 | 1.0 | 0.0 |
| Ruddy Duck | 82.1 | 65.9 | 58.8 | 75.6 | 28.0 | 1.9 | 9.5 | 39.3 |
| Subtotal | 209.4 | 175.9 | 168.7 | 240.9 | 107.1 | 59.4 | 61.2 | 103.1 |
| Miscellaneous | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 4.0 | 2.9 | 3.7 | 2.4 | 0.5 | 1.4 | 0.0 | 0.9 |
| Subtotal | 4.0 | 2.9 | 3.7 | 2.4 | 0.5 | 1.4 | 0.0 | 0.9 |
| Total Ducks | 3882.5 | 4049.1 | 4301.1 | 2764.9 | 2088.9 | 1671.7 | 1588.9 | 2143.6 |
| Canada Goose | 111.8 | 165.3 | 169.9 | 88.7 | 130.4 | 108.0 | 108.2 | 121.0 |
| Am. coot | 458.6 | 300.9 | 141.7 | 235.1 | 22.0 | 32.2 | 32.6 | 60.5 |
| Ponds | 1025.0 | 627.6 | 989.1 | 433.9 | 473.9 | 305.2 | 326.5 | 531.5 |

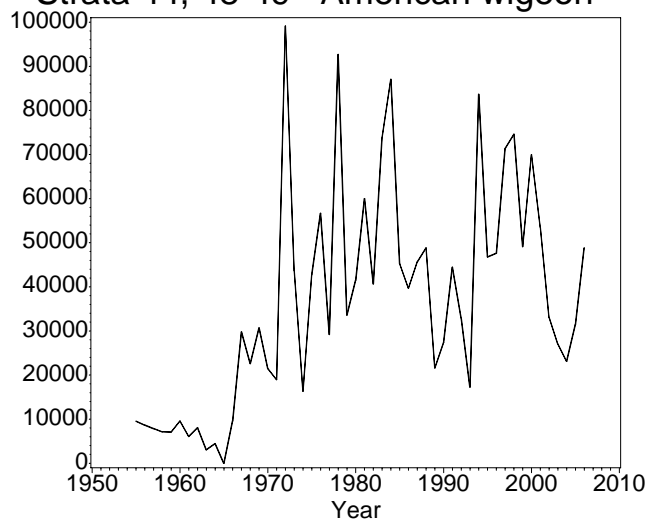
Strata 44, 48-49 Mallard



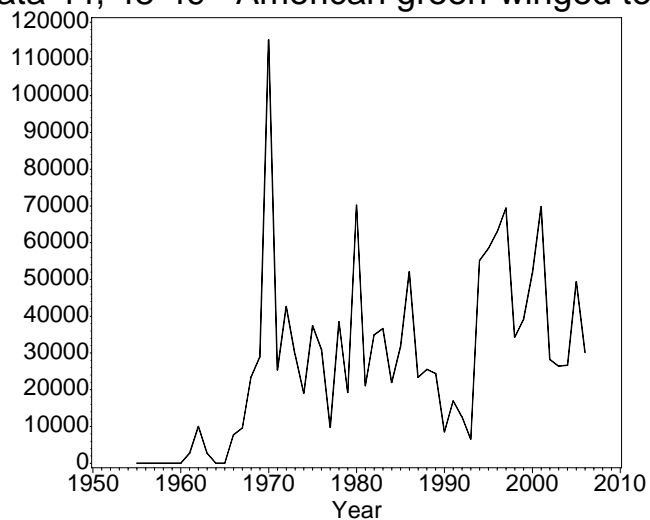
Strata 44, 48-49 Gadwall



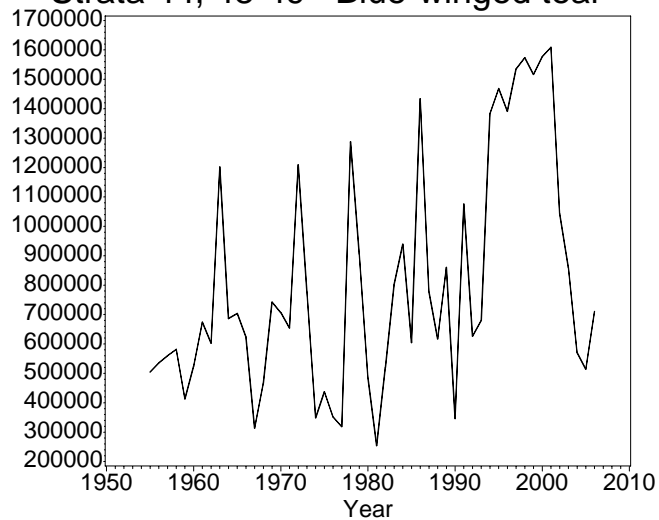
Strata 44, 48-49 American wigeon



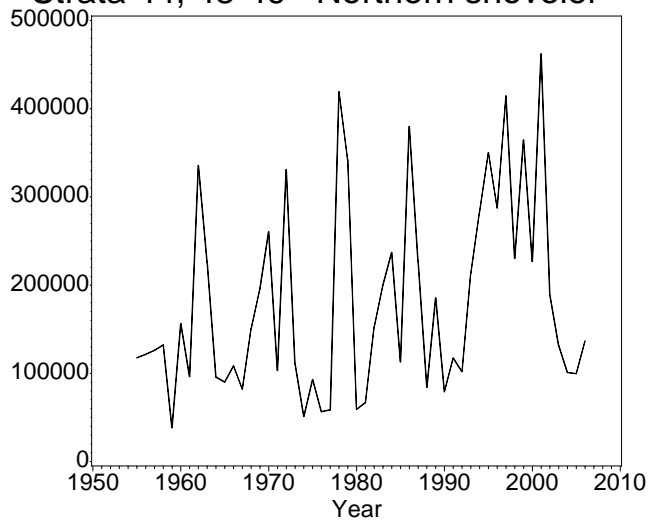
Strata 44, 48-49 American green-winged teal



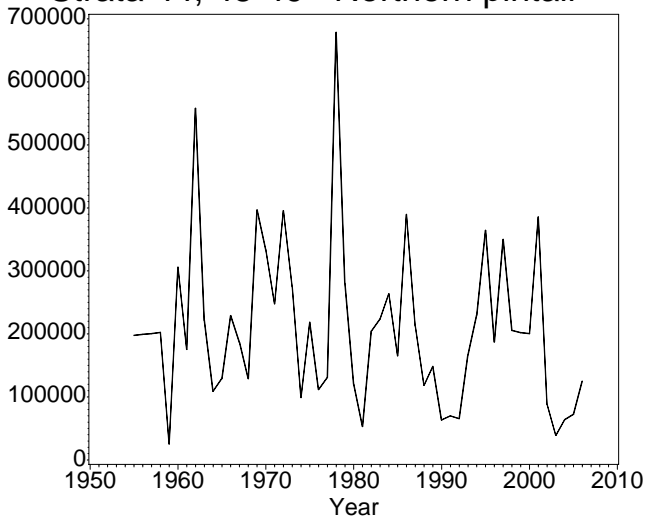
Strata 44, 48-49 Blue-winged teal



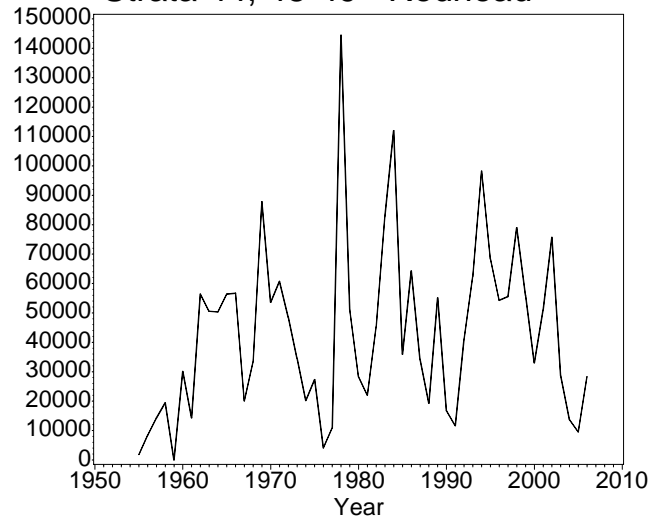
Strata 44, 48-49 Northern shoveler



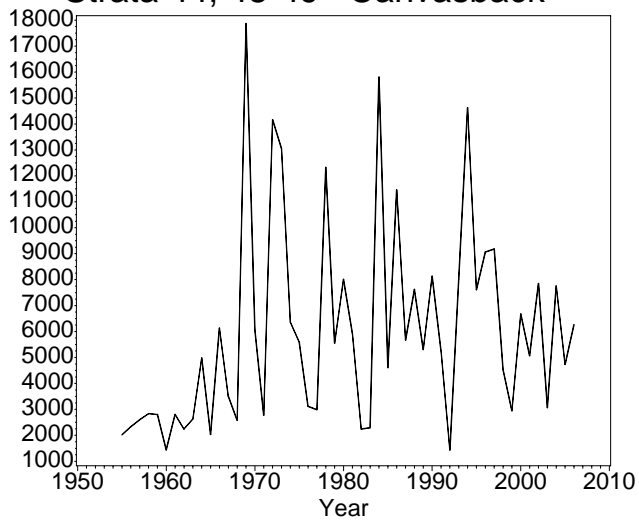
Strata 44, 48-49 Northern pintail



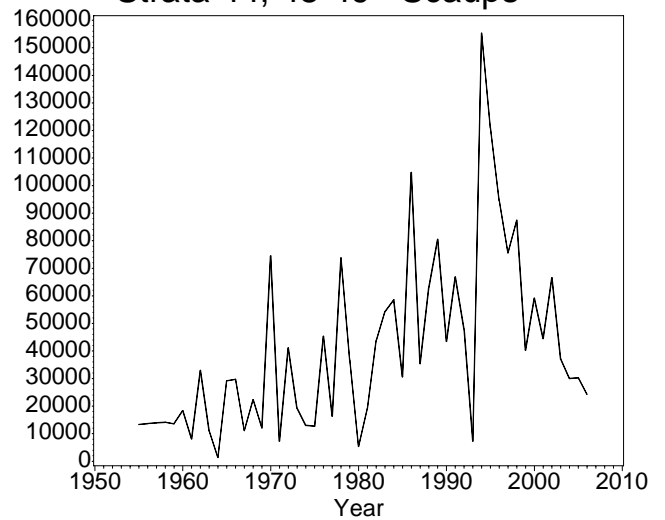
Strata 44, 48-49 Redhead



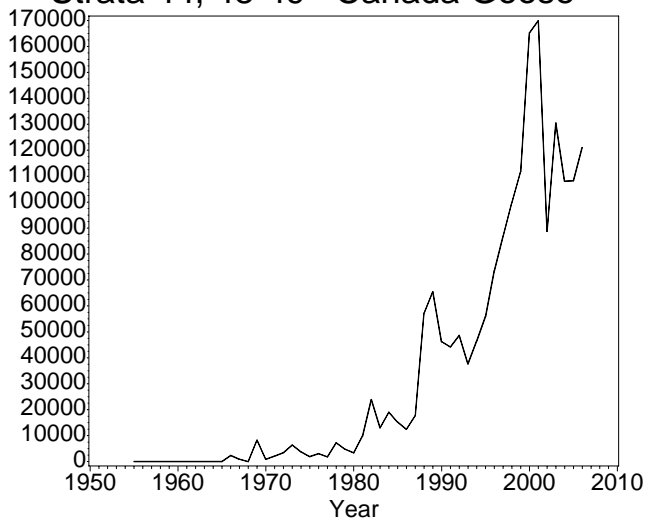
Strata 44, 48-49 Canvasback



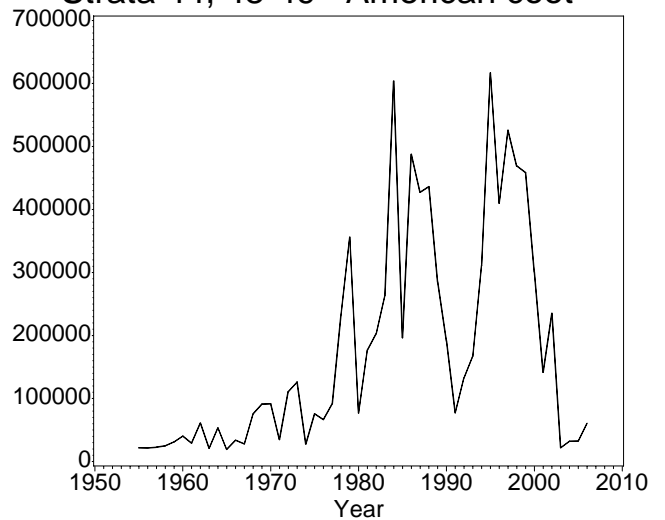
Strata 44, 48-49 Scaups



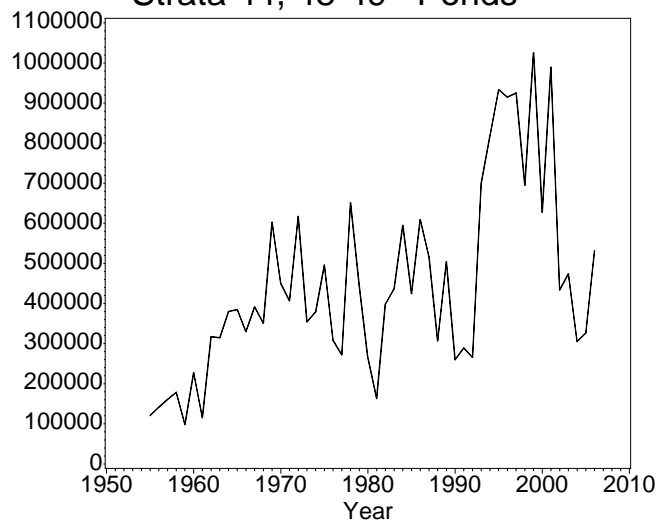
Strata 44, 48-49 Canada Goose



Strata 44, 48-49 American coot



Strata 44, 48-49 Ponds



Strata 44, 48-49 Total Ducks

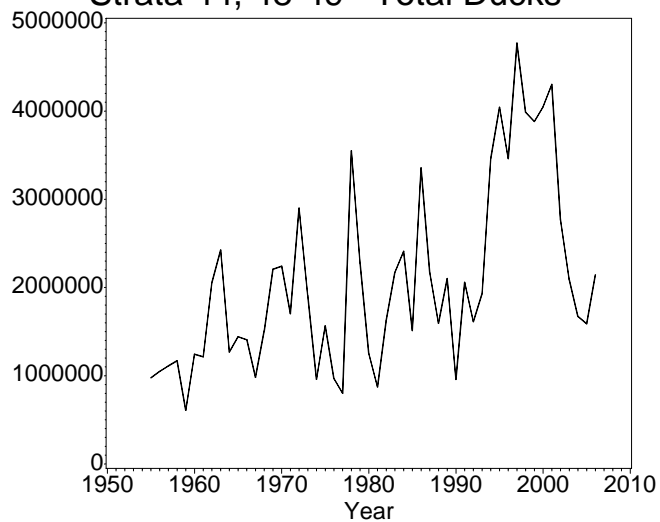


Table 4. Status of waterfowl breeding population estimates (thousands, adjusted for visibility bias) by species and stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean (from 1958) for North Dakota.

| Stratum (2006) | | | | | | | | % Change From | | | |
|-----------------------|-------|--------|--------|-------|------------|------------|--------------|----------------|---------|--------------|----------------|
| Species/Ponds | 43 | 45 | 46 | 47 | 2006 Total | 2005 Total | 10-Year Mean | Long-Term Mean | 2005 | 10-Year Mean | Long-Term Mean |
| Ducks | | | | | | | | | | | |
| Dabblers | | | | | | | | | | | |
| Mallard | 158.8 | 638.0 | 393.2 | 57.5 | 1247.5 | 1070.8 | 1272.6 | 630.7 | 16.5% | -2.0% | 97.8% |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | -100.0% | -100.0% | -100.0% |
| Gadwall | 48.6 | 279.0 | 159.7 | 8.8 | 496.1 | 522.4 | 822.6 | 386.3 | -5.0% | -39.7% | 28.4% |
| Am. wigeon | 19.7 | 29.7 | 17.0 | 1.4 | 67.8 | 65.3 | 78.8 | 46.4 | 3.9% | -13.9% | 46.2% |
| Am. green-winged teal | 7.3 | 26.6 | 28.0 | 0.0 | 62.0 | 40.6 | 60.8 | 37.1 | 52.7% | 1.9% | 67.1% |
| Blue-winged teal | 95.4 | 592.6 | 336.3 | 57.8 | 1082.2 | 953.0 | 1636.3 | 887.0 | 13.6% | -33.9% | 22.0% |
| N. shoveler | 43.4 | 195.3 | 100.1 | 11.4 | 350.2 | 429.4 | 485.2 | 281.0 | -18.4% | -27.8% | 24.6% |
| N. pintail | 39.2 | 118.3 | 54.7 | 3.6 | 215.8 | 212.8 | 294.3 | 333.6 | 1.4% | -26.7% | -35.3% |
| Subtotal | 412.4 | 1879.5 | 1089.0 | 140.6 | 3521.5 | 3294.7 | 4650.7 | 2602.1 | 6.9% | -24.3% | 35.3% |
| Divers | | | | | | | | | | | |
| Redhead | 3.3 | 71.6 | 37.7 | 1.7 | 114.3 | 103.9 | 209.9 | 136.1 | 10.0% | -45.6% | -16.0% |
| Canvasback | 1.8 | 23.0 | 3.5 | 0.0 | 28.4 | 27.9 | 42.5 | 29.7 | 1.8% | -33.1% | -4.5% |
| Scaups | 3.8 | 59.4 | 56.3 | 0.0 | 119.6 | 105.0 | 139.9 | 75.6 | 13.9% | -14.5% | 58.1% |
| Ring-necked duck | 4.4 | 1.0 | 0.3 | 0.0 | 5.7 | 9.6 | 11.6 | 8.3 | -40.1% | -50.6% | -30.9% |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.2 | -- | -100.0% | -100.0% |
| Bufflehead | 0.6 | 0.0 | 1.0 | 0.0 | 1.6 | 0.3 | 1.9 | 1.3 | 513.1% | -17.9% | 19.3% |
| Ruddy Duck | 18.7 | 66.8 | 50.0 | 4.2 | 139.7 | 138.1 | 160.0 | 95.9 | 1.2% | -12.6% | 45.6% |
| Subtotal | 32.6 | 221.8 | 148.9 | 5.9 | 409.3 | 384.6 | 565.9 | 347.2 | 6.4% | -27.7% | 17.9% |
| Miscellaneous | | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -- | -- | -- |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -- | -- | -- |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | -- | -- | -100.0% |
| Mergansers | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | 1.2 | 0.8 | -100.0% | -100.0% | -100.0% |
| Subtotal | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.9 | 1.2 | 0.8 | -100.0% | -100.0% | -100.0% |
| Total Ducks | 445.1 | 2101.3 | 1237.9 | 146.5 | 3930.8 | 3680.3 | 5217.8 | 2950.2 | 6.8% | -24.7% | 33.2% |
| Canada Goose | 19.8 | 132.4 | 79.5 | 0.9 | 232.6 | 239.8 | 137.0 | 36.1 | -3.0% | 69.8% | 544.1% |
| Am. coot | 9.6 | 48.3 | 38.5 | 7.4 | 103.8 | 84.4 | 697.3 | 390.8 | 23.0% | -85.1% | -73.4% |
| Ponds | 125.5 | 412.5 | 225.2 | 48.3 | 811.5 | 761.1 | 948.9 | 736.0 | 6.6% | -14.5% | 10.3% |

Table 5. Long-term trend in adjusted May pond estimates (thousands) by stratum with comparisons against the previous year, the previous 10-year mean, and the long-term mean (from 1974) for North Dakota. Estimates prior to 1974 were not adjusted for visibility bias.

| Year | Stratum (2006) | | | | Total |
|---------------------|----------------|--------|--------|-------|--------|
| | 43 | 45 | 46 | 47 | |
| 1961 | 11.8 | 38.2 | 26.3 | 9.6 | 85.8 |
| 1962 | 25.5 | 132.6 | 97.1 | 17.4 | 272.6 |
| 1963 | 41.6 | 206.2 | 150.9 | 17.4 | 416.1 |
| 1964 | 29.4 | 107.2 | 41.4 | 10.4 | 188.5 |
| 1965 | 51.3 | 199.4 | 103.8 | 13.9 | 368.4 |
| 1966 | 55.7 | 265.5 | 182.9 | 36.5 | 540.6 |
| 1967 | 50.1 | 311.7 | 168.8 | 29.9 | 560.6 |
| 1968 | 54.0 | 141.1 | 109.9 | 11.7 | 316.8 |
| 1969 | 89.5 | 326.2 | 169.9 | 31.6 | 617.2 |
| 1970 | 101.5 | 473.0 | 152.4 | 29.2 | 756.1 |
| 1971 | 109.4 | 365.5 | 87.4 | 17.0 | 579.3 |
| 1972 | 130.9 | 338.2 | 148.0 | 35.3 | 652.4 |
| 1973 | 88.4 | 167.4 | 54.0 | 11.8 | 321.6 |
| 1974 | 64.7 | 950.9 | 179.3 | 57.3 | 1252.2 |
| 1975 | 104.9 | 703.4 | 286.0 | 41.4 | 1135.8 |
| 1976 | 84.0 | 505.1 | 221.8 | 37.4 | 848.2 |
| 1977 | 88.2 | 179.2 | 60.1 | 12.8 | 340.3 |
| 1978 | 123.7 | 304.2 | 195.2 | 14.2 | 637.3 |
| 1979 | 87.0 | 447.4 | 268.5 | 32.9 | 835.8 |
| 1980 | 65.4 | 179.5 | 89.4 | 11.1 | 345.5 |
| 1981 | 70.3 | 208.4 | 55.2 | 9.7 | 343.5 |
| 1982 | 140.5 | 443.2 | 183.4 | 19.0 | 786.0 |
| 1983 | 80.0 | 398.1 | 147.5 | 23.3 | 648.9 |
| 1984 | 113.9 | 554.6 | 269.2 | 27.7 | 965.4 |
| 1985 | 115.0 | 355.5 | 126.6 | 17.6 | 614.6 |
| 1986 | 120.0 | 381.2 | 201.7 | 25.8 | 728.8 |
| 1987 | 134.5 | 281.2 | 170.4 | 15.1 | 601.1 |
| 1988 | 94.7 | 135.4 | 74.8 | 8.7 | 313.6 |
| 1989 | 116.4 | 198.6 | 117.5 | 15.5 | 448.0 |
| 1990 | 72.8 | 64.9 | 39.5 | 8.0 | 185.2 |
| 1991 | 72.4 | 59.1 | 36.1 | 7.7 | 175.3 |
| 1992 | 119.6 | 146.7 | 47.9 | 9.4 | 323.6 |
| 1993 | 106.4 | 167.3 | 163.0 | 18.4 | 455.1 |
| 1994 | 203.2 | 412.0 | 275.5 | 27.9 | 918.7 |
| 1995 | 197.0 | 581.6 | 348.0 | 34.1 | 1160.6 |
| 1996 | 193.9 | 545.0 | 386.1 | 55.8 | 1180.7 |
| 1997 | 163.0 | 558.8 | 393.3 | 42.4 | 1157.6 |
| 1998 | 159.4 | 462.4 | 359.0 | 64.0 | 1044.8 |
| 1999 | 137.5 | 895.5 | 361.3 | 45.6 | 1439.9 |
| 2000 | 105.1 | 363.2 | 242.4 | 23.6 | 734.3 |
| 2001 | 86.2 | 414.9 | 222.1 | 26.9 | 750.2 |
| 2002 | 96.4 | 373.7 | 192.5 | 19.9 | 682.5 |
| 2003 | 107.0 | 499.4 | 277.1 | 49.5 | 933.1 |
| 2004 | 159.3 | 455.4 | 163.8 | 26.0 | 804.5 |
| 2005 | 184.7 | 373.2 | 174.9 | 28.2 | 761.1 |
| 2006 | 125.5 | 412.5 | 225.2 | 48.3 | 811.5 |
| 10-year Mean | 139.3 | 494.2 | 277.3 | 38.2 | 948.9 |
| Long-term Mean | 117.7 | 393.7 | 197.8 | 26.8 | 736.0 |
| Percent Change: | | | | | |
| From 2005 | -32.1% | 10.5% | 28.7% | 71.1% | 6.6% |
| From 10-year Mean | -9.9% | -16.5% | -18.8% | 26.5% | -14.5% |
| From Long-term Mean | 6.6% | 4.8% | 13.8% | 80.4% | 10.3% |

Table 6. Survey design for North Dakota, May 2006.

| | Stratum | | | | |
|-------------------------------|----------|---------|---------|----------|--------|
| | 43 | 45 | 46 | 47 | Total |
| <hr/> | | | | | |
| <u>Survey design</u> | | | | | |
| Square miles in stratum | 19,835 | 26,625 | 14,238 | 7,821 | 68,519 |
| Square miles in sample | 175.5 | 310.5 | 270.0 | 45.0 | 801.0 |
| Linear miles in sample | 702 | 1,242 | 1,080 | 180 | 3,204 |
| Number of transects in sample | 5 | 7 | 8 | 6 | 26 |
| Number of segments in sample | 39 | 69 | 60 | 10 | 178 |
| Expansion factor | 113.0199 | 85.7487 | 52.7333 | 173.8000 | --- |
| | | | | | |
| <u>Current year coverage</u> | | | | | |
| Square miles in sample | 175.5 | 310.5 | 270.0 | 45.0 | 801.0 |
| Linear miles in sample | 702 | 1,188 | 1,080 | 180 | 3,204 |
| Number of transects in sample | 5 | 7 | 8 | 6 | 26 |
| Number of segments in sample | 39 | 69 | 60 | 10 | 178 |
| Expansion factor | 113.0199 | 85.7487 | 52.7333 | 173.8000 | --- |

Appendix 2. Long-term trend in adjusted waterfowl breeding population estimates (thousands) in North Dakota.

| Species/Ponds | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Ducks | | | | | | | | | | |
| Dabblers | | | | | | | | | | |
| Mallard | 402.4 | 162.2 | 288.5 | 225.9 | 238.1 | 512.8 | 271.1 | 430.2 | 507.1 | 545.0 |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 44.8 | 13.4 | 85.2 | 56.4 | 156.2 | 213.8 | 86.0 | 226.8 | 269.5 | 216.2 |
| Am. wigeon | 24.7 | 24.9 | 22.8 | 5.0 | 3.8 | 16.4 | 4.6 | 5.9 | 18.6 | 27.9 |
| Am. green-winged teal | 4.5 | 0.0 | 0.0 | 6.8 | 0.0 | 2.2 | 0.0 | 3.3 | 60.9 | 26.9 |
| Blue-winged teal | 528.7 | 316.4 | 519.5 | 295.6 | 755.2 | 686.6 | 584.5 | 913.5 | 1041.7 | 1106.1 |
| N. shoveler | 62.9 | 45.3 | 184.8 | 106.8 | 271.5 | 221.0 | 102.8 | 289.4 | 290.4 | 403.8 |
| N. pintail | 330.4 | 62.8 | 632.7 | 244.9 | 429.6 | 320.7 | 230.3 | 478.6 | 495.3 | 544.9 |
| Subtotal | 1398.3 | 625.0 | 1733.4 | 941.4 | 1854.5 | 1973.5 | 1279.2 | 2347.6 | 2683.5 | 2870.8 |
| Divers | | | | | | | | | | |
| Redhead | 34.1 | 15.3 | 88.9 | 39.3 | 91.2 | 97.4 | 58.5 | 117.1 | 203.1 | 163.1 |
| Canvasback | 30.7 | 6.9 | 13.2 | 3.1 | 2.2 | 14.7 | 17.2 | 19.0 | 53.6 | 26.5 |
| Scaups | 11.7 | 22.1 | 40.7 | 18.3 | 77.7 | 15.1 | 3.0 | 14.0 | 15.5 | 22.1 |
| Ring-necked duck | 0.0 | 0.0 | 2.9 | 0.0 | 0.0 | 0.9 | 0.0 | 0.0 | 2.5 | 0.0 |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.2 | 0.0 |
| Bufflehead | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.0 |
| Ruddy Duck | 1.6 | 23.8 | 44.3 | 23.3 | 27.5 | 18.2 | 5.4 | 9.0 | 33.4 | 41.8 |
| Subtotal | 78.1 | 68.1 | 190.0 | 84.0 | 198.6 | 146.3 | 84.1 | 159.3 | 309.4 | 253.6 |
| Miscellaneous | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | 0.2 | 0.0 |
| Subtotal | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.0 | 0.2 | 0.2 | 0.0 |
| Total Ducks | 1476.4 | 693.1 | 1923.4 | 1025.5 | 2053.1 | 2120.0 | 1363.3 | 2507.2 | 2993.2 | 3124.4 |
| Canada Goose | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 |
| Am. coot | 59.0 | 94.4 | 82.0 | 51.1 | 104.0 | 47.4 | 14.2 | 93.8 | 150.5 | 203.3 |
| Ponds | | | | | | | | | | |
| Species/Ponds | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 |
| Ducks | | | | | | | | | | |
| Dabblers | | | | | | | | | | |
| Mallard | 434.6 | 462.6 | 736.6 | 769.3 | 674.0 | 547.2 | 458.4 | 566.5 | 368.0 | 292.1 |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 352.9 | 323.1 | 373.9 | 372.2 | 353.6 | 223.2 | 213.6 | 330.1 | 76.5 | 103.0 |
| Am. wigeon | 8.3 | 40.5 | 30.0 | 28.1 | 29.1 | 36.0 | 44.1 | 72.8 | 62.3 | 31.7 |
| Am. green-winged teal | 12.4 | 67.0 | 138.6 | 23.4 | 51.0 | 38.0 | 75.0 | 59.4 | 17.4 | 7.4 |
| Blue-winged teal | 749.7 | 902.9 | 712.7 | 1238.1 | 780.3 | 588.7 | 1171.3 | 1051.4 | 357.0 | 282.2 |
| N. shoveler | 194.8 | 304.0 | 454.9 | 219.4 | 289.9 | 129.7 | 219.5 | 225.2 | 89.7 | 71.2 |
| N. pintail | 169.4 | 693.7 | 831.6 | 690.0 | 749.1 | 257.1 | 487.1 | 455.6 | 208.6 | 91.1 |
| Subtotal | 1922.2 | 2793.9 | 3278.5 | 3340.4 | 2926.9 | 1819.9 | 2669.0 | 2761.1 | 1179.5 | 878.6 |
| Divers | | | | | | | | | | |
| Redhead | 93.3 | 177.1 | 153.5 | 123.7 | 126.9 | 94.6 | 110.7 | 214.8 | 63.6 | 31.9 |
| Canvasback | 17.3 | 58.9 | 24.7 | 14.7 | 30.2 | 28.5 | 63.0 | 39.3 | 15.3 | 10.3 |
| Scaups | 16.6 | 36.3 | 28.3 | 28.2 | 30.4 | 41.9 | 37.3 | 70.3 | 54.1 | 19.7 |
| Ring-necked duck | 0.0 | 0.6 | 2.8 | 1.1 | 0.7 | 0.0 | 0.6 | 1.2 | 1.1 | 1.4 |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bufflehead | 0.0 | 0.0 | 1.8 | 0.0 | 2.6 | 0.5 | 0.0 | 0.0 | 0.7 | 0.0 |
| Ruddy Duck | 15.5 | 45.2 | 86.0 | 47.0 | 55.1 | 40.7 | 167.0 | 125.1 | 22.8 | 21.1 |
| Subtotal | 142.8 | 318.0 | 297.1 | 214.7 | 247.1 | 206.1 | 378.5 | 450.7 | 157.7 | 84.4 |
| Miscellaneous | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 0.0 | 2.9 | 0.0 | 0.0 | 1.4 | 0.7 | 0.7 | 0.0 | 0.0 | 0.0 |
| Subtotal | 0.0 | 2.9 | 0.0 | 0.0 | 1.4 | 0.7 | 0.7 | 0.0 | 0.0 | 0.0 |
| Total Ducks | 2065.0 | 3114.7 | 3575.6 | 3555.1 | 3175.4 | 2026.7 | 3048.2 | 3211.8 | 1337.2 | 963.0 |
| Canada Goose | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.8 | 0.9 | 3.3 | 2.2 | 3.8 |
| Am. coot | 127.5 | 131.3 | 192.3 | 147.7 | 178.8 | 124.7 | 368.9 | 512.9 | 104.2 | 74.8 |
| Ponds | | | | | | | 1252.2 | 1135.8 | 848.2 | 340.3 |

Appendix 2 (continued). Long-term trend in adjusted waterfowl breeding population estimates (thousands) in North Dakota.

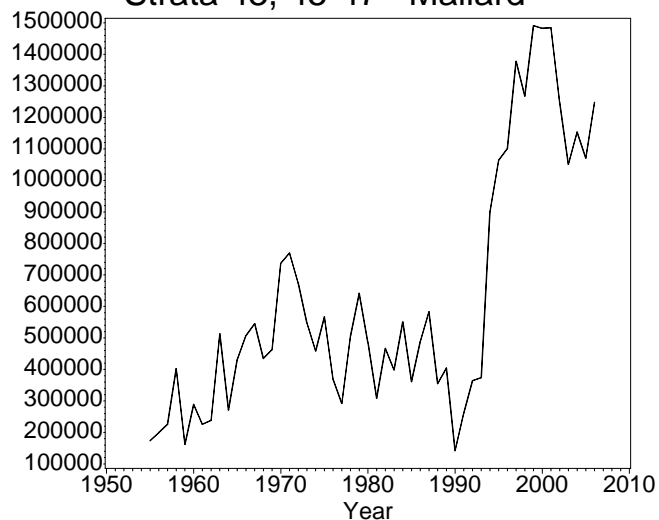
| Species/Ponds | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Ducks | | | | | | | | | | |
| Dabblers | | | | | | | | | | |
| Mallard | 506.6 | 641.4 | 485.4 | 308.6 | 466.5 | 398.9 | 550.3 | 361.4 | 487.8 | 582.6 |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 243.9 | 369.2 | 224.3 | 255.6 | 381.2 | 435.0 | 528.8 | 274.0 | 287.7 | 275.9 |
| Am. wigeon | 69.4 | 47.4 | 84.0 | 119.2 | 41.5 | 45.1 | 38.7 | 58.9 | 30.9 | 44.1 |
| Am. green-winged teal | 20.5 | 25.4 | 92.4 | 39.2 | 52.6 | 16.4 | 16.2 | 58.9 | 20.1 | 33.5 |
| Blue-winged teal | 737.4 | 826.5 | 888.4 | 252.8 | 906.3 | 545.7 | 861.0 | 547.0 | 871.8 | 579.4 |
| N. shoveler | 277.5 | 447.3 | 181.9 | 264.1 | 377.4 | 194.3 | 273.3 | 153.2 | 244.7 | 255.5 |
| N. pintail | 588.5 | 517.3 | 291.8 | 135.2 | 369.4 | 329.4 | 375.5 | 198.9 | 260.0 | 191.6 |
| Subtotal | 2443.7 | 2874.5 | 2248.2 | 1374.7 | 2594.9 | 1964.8 | 2643.7 | 1652.3 | 2202.9 | 1962.8 |
| Divers | | | | | | | | | | |
| Redhead | 191.8 | 198.3 | 122.7 | 75.2 | 258.2 | 226.3 | 170.3 | 116.9 | 103.5 | 99.0 |
| Canvasback | 17.0 | 42.7 | 28.5 | 31.9 | 32.4 | 12.4 | 50.9 | 20.1 | 36.3 | 28.7 |
| Scaups | 99.8 | 199.2 | 47.7 | 107.5 | 103.9 | 92.6 | 120.8 | 102.1 | 129.4 | 91.4 |
| Ring-necked duck | 2.2 | 8.4 | 3.6 | 0.0 | 11.6 | 103.0 | 12.2 | 3.5 | 11.6 | 3.2 |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.5 | 1.4 | 0.0 | 0.0 | 1.0 |
| Bufflehead | 1.0 | 2.4 | 1.4 | 1.0 | 0.7 | 3.7 | 7.1 | 0.5 | 0.8 | 0.0 |
| Ruddy Duck | 123.3 | 98.0 | 111.4 | 237.6 | 357.1 | 184.8 | 251.8 | 111.9 | 170.1 | 113.9 |
| Subtotal | 435.0 | 549.0 | 315.4 | 453.2 | 763.9 | 625.2 | 614.4 | 355.0 | 451.7 | 337.2 |
| Miscellaneous | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 6.3 | 2.7 | 0.5 | 0.0 | 0.5 |
| Subtotal | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 6.3 | 2.7 | 0.5 | 0.0 | 0.5 |
| Total Ducks | 2878.7 | 3423.5 | 2563.6 | 1827.9 | 3359.1 | 2596.3 | 3260.8 | 2007.8 | 2654.6 | 2300.5 |
| Canada Goose | 0.9 | 2.7 | 3.7 | 7.4 | 22.4 | 10.5 | 13.7 | 11.3 | 17.0 | 12.3 |
| Am. coot | 389.6 | 1358.1 | 396.0 | 374.7 | 561.3 | 411.0 | 898.9 | 309.7 | 313.2 | 530.3 |
| Ponds | 637.3 | 835.8 | 345.5 | 343.5 | 786.0 | 648.9 | 965.4 | 614.6 | 728.8 | 601.1 |

| Species/Ponds | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|-----------------------|--------|--------|-------|-------|--------|--------|--------|--------|--------|--------|
| Ducks | | | | | | | | | | |
| Dabblers | | | | | | | | | | |
| Mallard | 354.9 | 404.0 | 142.2 | 261.8 | 364.1 | 374.1 | 900.7 | 1063.9 | 1100.5 | 1377.7 |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Gadwall | 294.9 | 296.3 | 296.0 | 197.9 | 388.7 | 285.8 | 433.3 | 757.4 | 806.3 | 893.8 |
| Am. wigeon | 40.8 | 15.6 | 22.9 | 20.9 | 44.1 | 13.9 | 71.4 | 92.0 | 78.9 | 83.2 |
| Am. green-winged teal | 28.3 | 9.5 | 26.7 | 9.1 | 14.1 | 9.0 | 60.5 | 45.9 | 90.6 | 79.0 |
| Blue-winged teal | 553.9 | 338.5 | 230.4 | 233.4 | 401.4 | 303.1 | 1088.8 | 1463.1 | 1764.1 | 1544.6 |
| N. shoveler | 118.4 | 158.7 | 67.1 | 75.2 | 114.7 | 175.1 | 507.8 | 573.6 | 653.8 | 492.2 |
| N. pintail | 149.7 | 109.0 | 61.8 | 49.3 | 112.1 | 126.9 | 375.5 | 424.9 | 351.5 | 418.1 |
| Subtotal | 1541.1 | 1331.5 | 847.1 | 847.7 | 1439.2 | 1288.0 | 3438.0 | 4420.8 | 4845.8 | 4888.7 |
| Divers | | | | | | | | | | |
| Redhead | 55.2 | 133.4 | 17.0 | 14.7 | 78.8 | 102.2 | 155.0 | 218.2 | 257.9 | 216.5 |
| Canvasback | 19.2 | 39.2 | 10.1 | 8.6 | 17.3 | 19.8 | 56.1 | 42.0 | 58.6 | 69.2 |
| Scaups | 83.0 | 38.8 | 43.6 | 89.9 | 23.0 | 36.6 | 109.6 | 108.5 | 91.5 | 115.5 |
| Ring-necked duck | 10.5 | 10.9 | 9.6 | 5.0 | 10.3 | 0.4 | 15.7 | 44.4 | 12.1 | 11.2 |
| Goldeneyes | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 0.0 |
| Bufflehead | 0.5 | 2.1 | 0.5 | 3.2 | 3.3 | 2.5 | 4.7 | 3.6 | 1.8 | 2.0 |
| Ruddy Duck | 12.6 | 55.3 | 62.5 | 14.0 | 29.5 | 33.9 | 105.6 | 78.6 | 72.8 | 180.2 |
| Subtotal | 181.1 | 279.7 | 143.3 | 135.5 | 162.0 | 195.4 | 447.3 | 495.3 | 494.7 | 594.6 |
| Miscellaneous | | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 0.0 | 0.7 | 4.3 | 3.2 | 0.0 | 0.3 | 0.5 | 1.4 | 0.3 | 0.9 |
| Subtotal | 0.0 | 0.7 | 4.3 | 3.7 | 0.0 | 0.3 | 0.5 | 1.4 | 0.3 | 0.9 |
| Total Ducks | 1722.2 | 1611.9 | 994.7 | 986.9 | 1601.3 | 1483.7 | 3885.8 | 4917.5 | 5340.8 | 5484.3 |
| Canada Goose | 18.0 | 34.9 | 26.6 | 18.0 | 32.1 | 21.2 | 40.9 | 55.5 | 51.8 | 69.5 |
| Am. coot | 429.1 | 246.8 | 161.7 | 58.1 | 84.1 | 113.9 | 608.0 | 1675.9 | 1241.9 | 1715.3 |
| Ponds | 313.6 | 448.0 | 185.2 | 175.3 | 323.6 | 455.1 | 918.7 | 1160.6 | 1180.7 | 1157.6 |

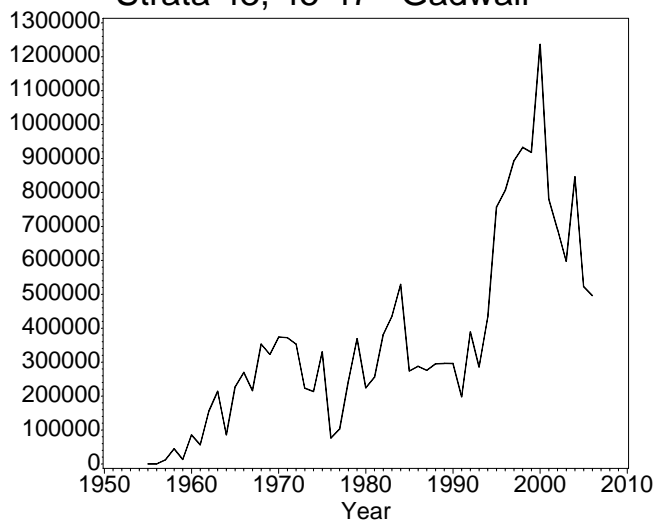
Appendix 2 (continued). Long-term trend in adjusted waterfowl breeding population estimates (thousands) in North Dakota.

| Species/Ponds | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Ducks | | | | | | | | | |
| Dabblers | | | | | | | | | |
| Mallard | 1267.7 | 1490.9 | 1482.8 | 1484.3 | 1247.7 | 1051.1 | 1152.9 | 1070.8 | 1247.5 |
| Am. black duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 |
| Gadwall | 932.9 | 918.4 | 1236.3 | 780.3 | 691.5 | 597.4 | 846.2 | 522.4 | 496.1 |
| Am. wigeon | 101.0 | 69.1 | 98.0 | 82.5 | 87.5 | 66.3 | 56.2 | 65.3 | 67.8 |
| Am. green-winged teal | 48.4 | 55.5 | 44.4 | 44.7 | 66.3 | 39.1 | 99.6 | 40.6 | 62.0 |
| Blue-winged teal | 1734.6 | 2068.0 | 2848.5 | 1688.7 | 1338.3 | 1327.1 | 1096.3 | 953.0 | 1082.2 |
| N. shoveler | 360.6 | 535.0 | 647.0 | 682.5 | 378.8 | 321.5 | 350.8 | 429.4 | 350.2 |
| N. pintail | 281.2 | 459.1 | 262.8 | 377.0 | 227.7 | 116.1 | 237.1 | 212.8 | 215.8 |
| Subtotal | 4726.4 | 5596.1 | 6619.8 | 5140.0 | 4037.9 | 3518.6 | 3839.1 | 3294.7 | 3521.5 |
| Divers | | | | | | | | | |
| Redhead | 327.6 | 259.8 | 306.1 | 226.4 | 143.5 | 96.4 | 161.3 | 103.9 | 114.3 |
| Canvasback | 49.4 | 42.3 | 20.8 | 66.5 | 32.5 | 20.0 | 37.5 | 27.9 | 28.4 |
| Scaups | 148.0 | 120.8 | 178.2 | 130.3 | 136.8 | 140.7 | 232.1 | 105.0 | 119.6 |
| Ring-necked duck | 7.0 | 20.6 | 6.2 | 13.3 | 22.8 | 10.6 | 2.5 | 9.6 | 5.7 |
| Goldeneyes | 0.0 | 0.0 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bufflehead | 1.1 | 0.3 | 3.2 | 5.2 | 2.4 | 2.5 | 0.6 | 0.3 | 1.6 |
| Ruddy Duck | 143.3 | 217.3 | 212.3 | 185.0 | 192.6 | 81.5 | 176.7 | 138.1 | 139.7 |
| Subtotal | 676.4 | 661.0 | 728.1 | 626.7 | 530.5 | 351.8 | 610.7 | 384.6 | 409.3 |
| Miscellaneous | | | | | | | | | |
| Long-tailed duck | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Eiders | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Scoters | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mergansers | 0.5 | 0.7 | 7.5 | 0.7 | 0.0 | 0.0 | 0.3 | 0.9 | 0.0 |
| Subtotal | 0.5 | 0.7 | 7.5 | 0.7 | 0.0 | 0.0 | 0.3 | 0.9 | 0.0 |
| Total Ducks | 5403.3 | 6257.9 | 7355.4 | 5767.4 | 4568.4 | 3870.4 | 4450.1 | 3680.3 | 3930.8 |
| Canada Goose | 76.5 | 104.5 | 161.6 | 184.1 | 122.9 | 175.3 | 183.8 | 239.8 | 232.6 |
| Am. coot | 767.9 | 889.9 | 912.6 | 319.6 | 437.9 | 77.9 | 525.8 | 84.4 | 103.8 |
| Ponds | 1044.8 | 1439.9 | 734.3 | 750.2 | 682.5 | 933.1 | 804.5 | 761.1 | 811.5 |

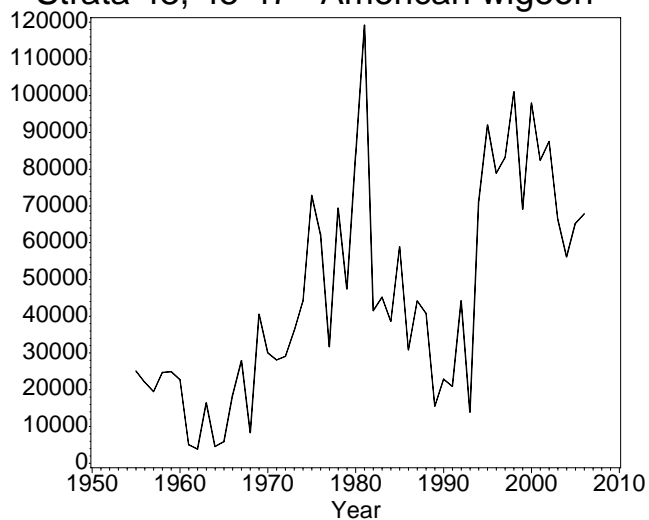
Strata 43, 45-47 Mallard



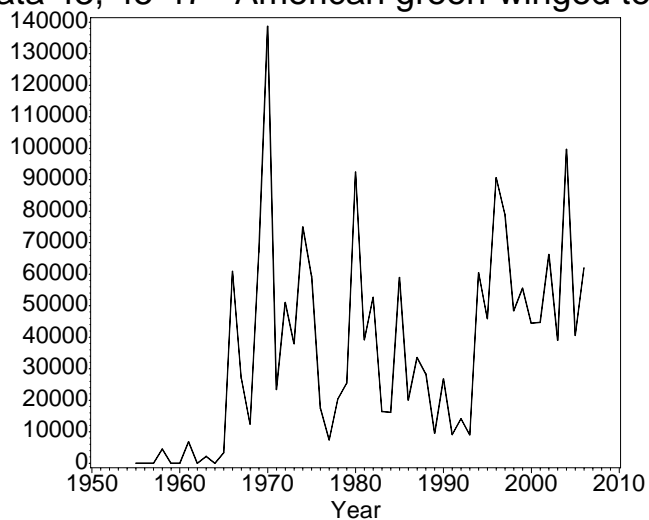
Strata 43, 45-47 Gadwall



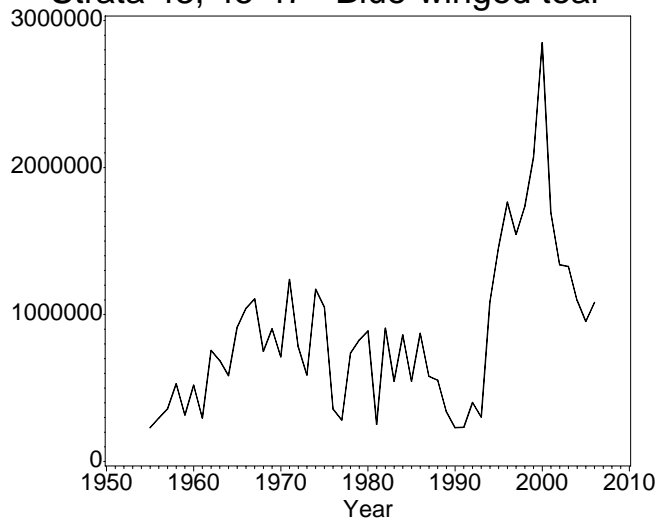
Strata 43, 45-47 American wigeon



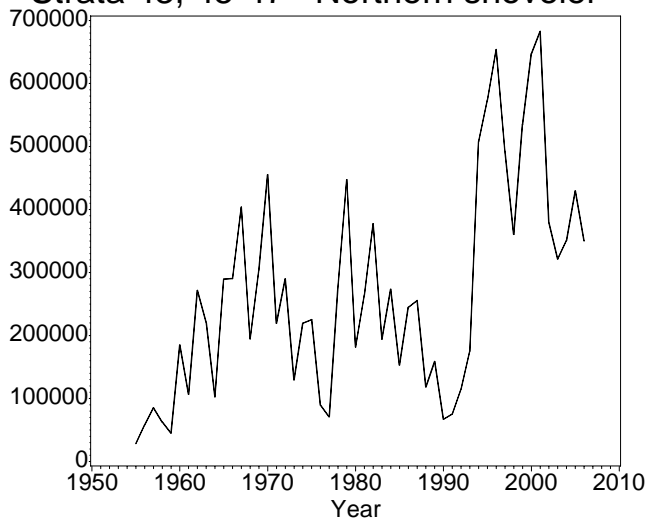
Strata 43, 45-47 American green-winged teal



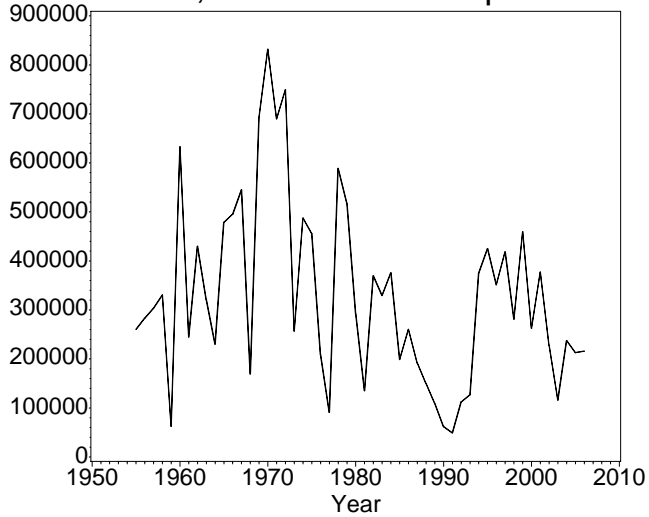
Strata 43, 45-47 Blue-winged teal



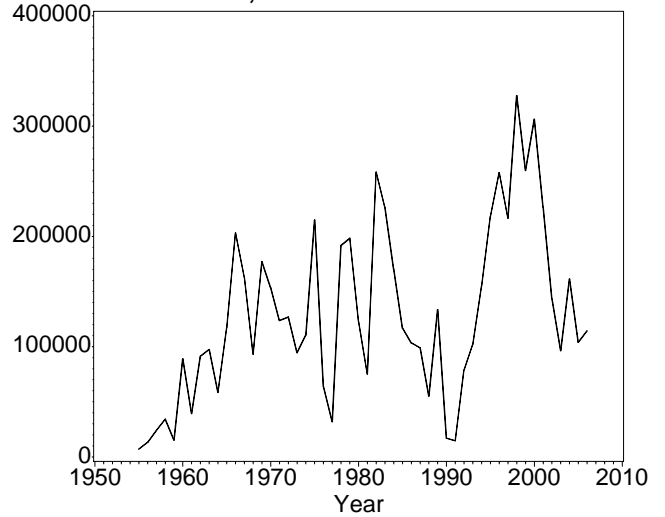
Strata 43, 45-47 Northern shoveler



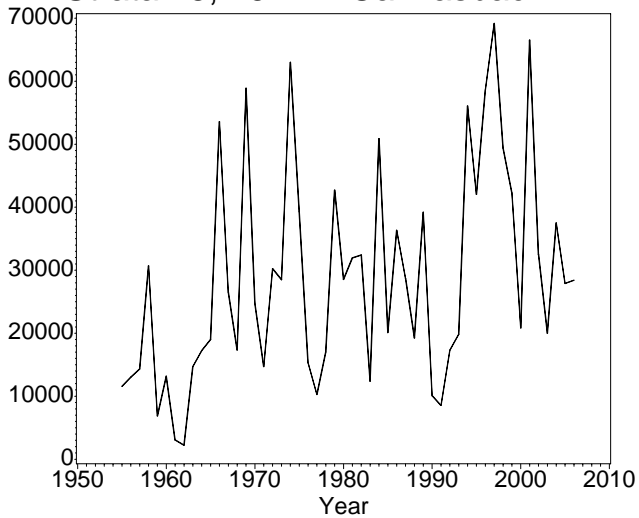
Strata 43, 45-47 Northern pintail



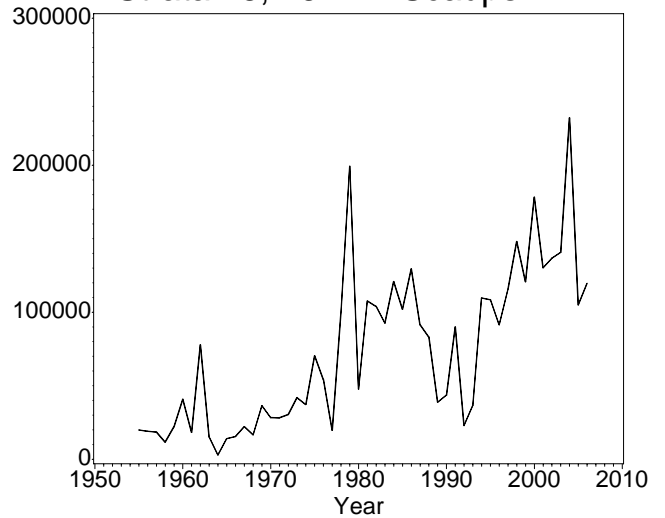
Strata 43, 45-47 Redhead



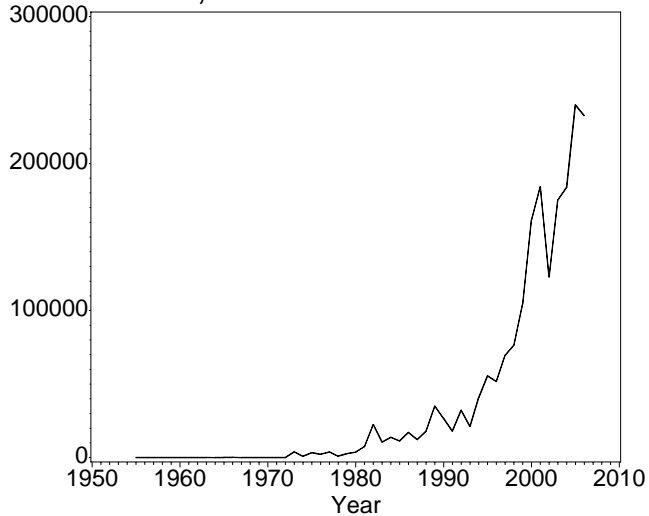
Strata 43, 45-47 Canvasback



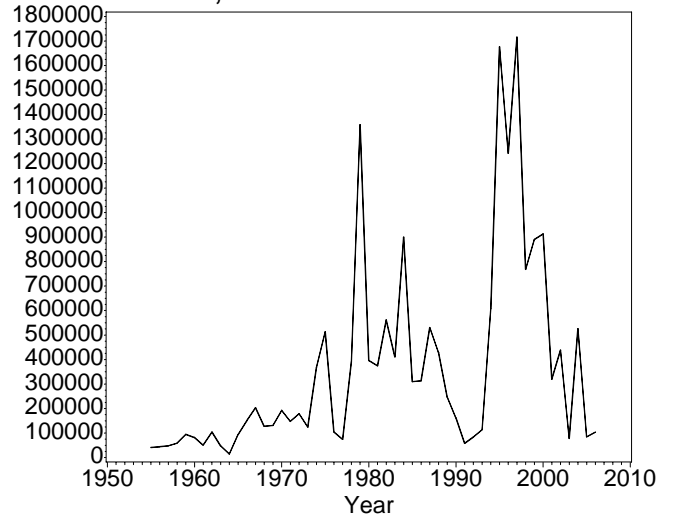
Strata 43, 45-47 Scaups



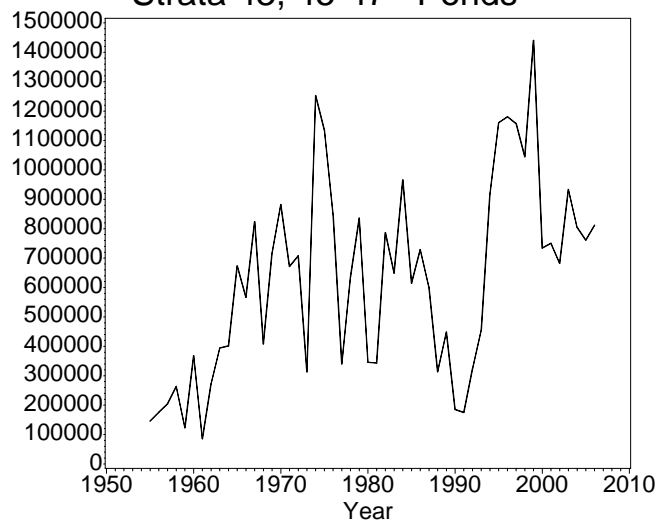
Strata 43, 45-47 Canada Goose



Strata 43, 45-47 American coot



Strata 43, 45-47 Ponds



Strata 43, 45-47 Total Ducks

